



Ultrasound Evaluation of Gallbladder Disease in Pregnancy

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Abstract

The study was carried out to find out the incidence of gallbladder disease in pregnancy in patients reporting at SMGS Hospital, Jammu (J&K). A total of 200 pregnant females, 100 from symptomatic and 100 from asymptomatic group in the age range of 16-40 year were studied. The incidence of gallstones during pregnancy was found to be 6%. The incidence of gallstones in pregnancy in the asymptomatic group was found to be 3% while it was higher (9%) in the symptomatic group. Nine percent of patients from the asymptomatic group while 27% of patients from the symptomatic group had biliary sludge. The incidence of gallbladder disease was higher in patients with high parity, higher body mass index, having used oral contraceptives and with family history of gallbladder disease. Thus, young pregnant patients specially with risk factors mentioned above should be subjected to ultrasonographic examination to rule out gallbladder disease.

Key Words

Gallbladder, Ultrasound, Pregnancy.

Introduction

A notable discovery in the last century by Von-Recklinghausen that 90% of women having gallstones have been gravid at least once and the subsequent findings by Courvoisier in autopsy studies that three times as many women have gallstones as men, hinted at the possibility of pregnancy being one of the major factors, in the development of cholelithiasis (1). Amongst additional strong associated factors in women are use of oral contraceptives and hormone replacement therapy (2).

Increased incidence of gallbladder disease in pregnancy may be related to an alteration in the

composition of bile with a decrease in the concentration of bile salts and an increase in cholesterol (3). Also, it has been noted that the hormonal changes of pregnancy decrease the contractility of the gallbladder leading to stasis, increased volume and a tendency to promote precipitation of cholesterol into stones (2). Increased serum concentration of progesterone, a smooth muscle relaxant by causing decreased tone or increased receptive relaxation may contribute to enlargement of gall bladder. Also, increased concentration of oestrogens in late pregnancy may decrease the activity of sodium pump, hence causing reduced absorption of water by gallbladder mucosa.

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Because of a high failure rate due to non-opacification and the risk of ionising radiation with oral cholecystography during pregnancy, this method has been replaced by ultrasonography for the study of gallbladder disease after 1980, because of its safety, reliability, accuracy, convenience and being less time consuming procedure.

In our set up, patients come from different socio-economic strata, have high parity and erratic feeding habits. Besides, use of oral contraceptives as a method of contraception is becoming popular, hence chances of detecting gallbladder disease by ultrasonography has further increased, especially in young pregnant patients. The present study was undertaken to evaluate gallbladder disease in pregnancy and the detection was done by using ultrasonography as a diagnostic tool.

Material and Methods

The present study was conducted on 200 pregnant patients attending the out-patient department or admitted in the department of Obstetrics and Gynaecology, SMGS Hospital, Jammu. Patients were selected at random, patients undergoing sonographic examination for obstetric reasons were also subjected to gallbladder examination and they constituted the asymptomatic group of 100 patients, while patients presenting with history of pain in right hypochondrium or epigastric region with or without jaundice, itching or vomiting constituted the symptomatic group of 100 patients.

In all cases, routine investigations including blood grouping, hematological and urine examination were performed after a detailed systemic and local examination. In the symptomatic patients, special investigations like liver function tests and ELISA for Australia antigen was done.

All the patients were subjected to ultrasonography after overnight fast with the help of an expert radiologist at the Radiology department of SMGS Hospital, Jammu.

The sonographic patterns obtained were grouped as follows :

Group I : Normal physiological distension of gallbladder.

Group II : Congenital variations.

Group III : Non-shadowing focal opacities within the gallbladder without distal shadowing but with or without gravitational movement (sludge).

Group IV : Cholelithiasis : Echogenic focus within the gallbladder with posterior shadowing and gravitational movement of the focus.

Group V : Miscellaneous group (chronic cholecystitis, viral hepatitis).

Observations

Out of 200 pregnant patients studied, gallbladder was successfully visualized in 97.5% of patients, 2.5% of the patients where gallbladder could not be visualized initially, were finally diagnosed as having chronic cholecystitis with contracted gallbladder and thickened gallbladder wall on rescans.

Majority of the patients (87%) in the asymptomatic category showed physiological distension of gallbladder (Group I) whereas, in the symptomatic category, it was seen in only 56% of cases. Two patients belonged to Group II in the symptomatic category, one had phrygian cap and the other had septate distended gallbladder. In respect of the symptomatic category, the total number of cases comprising Group III, IV and V accounted for 42% as against only 12% of cases in the asymptomatic group. In Group V, out of 6 patients in the symptomatic category, 2 patients had viral hepatitis and 4 patients had chronic cholecystitis. Thereby, it was concluded that these three groups viz. Group III, IV, V that account for gallbladder disease in pregnancy was significantly higher in the symptomatic category as compared to that in the asymptomatic category. (Table 1).

In the symptomatic category, forty-one patients presented with jaundice (34 had icterus gravidarum, 2 had cholelithiasis, 2 viral hepatitis and 3 were having chronic cholecystitis). Patients presenting with pain in epigastric area, itching, vomiting and pain in right

hypochondrium were 38%, 36%, 22% and 31% respectively. (Table 2).

Fifty percent patients from the asymptomatic category were in the age group of 21-25 years. The mean age of disease free cases was 25.41 years with a dispersion of 3.44 as against slightly higher mean age 27.77 years with a dispersion of 4.35 observed in gallbladder disease cases. (Table 3).

Fifty percent patients in the symptomatic category were in the age group of 21-25 years. The mean age of disease free cases was 25.16 years \pm 3.4 while that of cases with gallbladder disease was 25.67 years \pm 3.4 (Table 4).

Parity of patients studied from both the asymptomatic and the symptomatic category varied from nulliparous to para 4. Maximum number of patients were nullipara constituting 39% of the total patients in the asymptomatic category and 48% of the total patients in symptomatic category. The mean parity of disease free cases was 0.8 ± 0.2 while the mean parity of those with gallbladder disease was 1.84 ± 1.29 (asymptomatic category). The mean parity of disease free cases was 0.63 ± 0.80 while the mean parity of cases with gallbladder disease was 0.95 ± 1.02 (symptomatic category). It is, thus, inferred that the parity of cases with gallbladder disease is significantly higher as compared to cases free of gallbladder disease in the asymptomatic category ($P < 0.01$). In the symptomatic category although,

Table 1
Ultrasound Evaluation of Pregnant cases in Asymptomatic and Symptomatic Categories

Ultrasound findings	Distribution of Pregnant cases		Total cases	
	Asymptomatic Cases Number	Symptomatic Cases Number	Number	Percentage
Group I	87	56	143	71.50
Group II	0	2	2	1.00
Group III	9	27	36	18.00
Group IV	3	9	12	6.00
Group V	1	6	7	3.50
Total	100	100	200	100

Table 2
Distribution of Patients in Symptomatic Category According to presenting Symptoms

Symptoms	Total Number of patients	Ultrasound findings (in percentage)					Total No. of patients with abnormal findings (in percentage)
		Group I	Group II	Group III	Group IV	Group V	
Pain in right hypochondrium	31 (31%)	38.70	3.22	25.80	19.35	9.67	54.82
Pain in Epigastric area	38 (38%)	55.26	2.63	36.84	5.26	-	42.1
Itching	36 (36%)	61.11	-	30.55	5.56	2.77	38.88
Vomiting	22 (22%)	31.81	-	18.18	31.81	13.63	63.62
Yellowish Discolouration of eyes	41 (41%)	56.09	-	26.82	4.87	12.19	43.88

Table 3
Distribution of patients by age in relation to ultrasound findings (asymptomatic category)

Age groups (in years)	Total No. of patients	Ultrasound findings					Total No. of patients			
		Group I	Group II	Group III	Group IV	Group V	Without disease		With disease	
							No.	%age	No.	%age
16-20	7	6	0	1	0	0	6	85.71	1	14.29
21-25	50	46	0	4	0	0	46	92.00	4	8.00
26-30	31	27	0	3	1	0	27	87.09	4	12.91
31-35	11	8	0	1	2	0	8	72.73	3	27.27
36-40	1	0	0	0	0	1	0	0	1	100
Total	100	87	0	9	3	1	87	87.00	13	13.00

cases with gallbladder disease had a higher mean parity as compared to those without disease but the difference was not found to be statistically significant- $P > 0.05$. (Table 5 & 6).

Majority of patients in the asymptomatic category had their Body Mass Index (BMI) in the range of 19-22.99 comprising 49% of the total cases. The mean BMI of those with gallbladder disease was

higher at 23.19 ± 2.97 as compared to 22.57 ± 2.94 (Table 7).

BMI from the symptomatic category varied from 15-42.99, majority having BMI 23-26.99 constituted 38% of total cases. The mean BMI of those with gallbladder disease was 26.89 ± 4.99 while that of those without gallbladder disease was 24.42 ± 3.08 (Table 8).

Table 4
Distribution of patients by age in relation to ultrasound findings (symptomatic category).

Age groups (in years)	Total No. of patients	Ultrasound findings					Total No. of patients			
		Group I	Group II	Group III	Group IV	Group V	Without disease		With disease	
							No.	%age	No.	%age
16-20	8	6	0	1	0	1	6	75.00	2	25.00
21-25	50	32	1	11	4	2	33	66.00	17	34.00
26-30	36	15	0	13	5	3	15	41.67	21	58.33
31-35	6	3	1	2	0	0	4	66.67	2	33.33
Total	100	56	2	27	9	6	58	58.00	42	42.00

Table 5
Distribution of patients by parity in relation to ultrasound findings (asymptomatic category).

Parity	Total No. of patients	Ultrasound findings					Total No. of patients			
		Group I	Group II	Group III	Group IV	Group V	Without disease		With disease	
							No.	%age	No.	%age
0	39	37	0	2	0	0	37	94.87	2	5.13
1	36	33	0	2	1	0	33	91.67	3	8.33
2	19	14	0	4	1	0	14	73.88	5	26.32
3	5	3	0	1	1	0	3	80.00	2	40.00
4 & above	1	0	0	0	0	1	0	0	1	100.00
Total	100	87	0	9	3	1	87	87.0	13	13.0

Table 6
Distribution of patients by parity in relation to ultrasound findings (symptomatic category).

Parity	Total No. of patients	Ultrasound findings					Total No. of patients			
		Group I	Group II	Group III	Group IV	Group V	Without disease		With disease	
							No.	%age	No.	%age
0	48	31	0	11	3	3	31	64.58	17	35.42
1	35	17	2	9	4	3	19	54.28	16	45.72
2	9	6	0	3	0	0	6	66.67	3	33.33
3	8	2	0	4	2	0	2	25.00	6	75.00
4 & above	0	0	0	0	0	0	0	0.00	0	0.00
Total	100	56	2	27	9	6	58	58.00	42	42.00

Table 7
Distribution of patients by Body Mass Index in relation to ultrasound findings (asymptomatic category).

Body Mass Index	Total No. of patients	Ultrasound findings					Total No. of patients			
		Group I	Group II	Group III	Group IV	Group V	Without disease		With disease	
							No.	%age	No.	%age
15-18.99	8	8	0	0	0	0	8	100.00	0	0.00
19-22.99	49	43	0	4	2	0	43	87.75	6	12.25
23-26.99	34	30	0	3	1	0	30	88.23	4	11.77
27-30.99	8	5	0	2	0	1	5	62.50	3	37.50
31-34.99	1	1	0	0	0	0	1	100.00	0	0.00
Total	100	87	0	9	3	1	87	87.00	13	13.00

Table 8
Distribution of patients by Body Mass Index in relation to ultrasound findings (symptomatic category).

Body Mass Index	Total No. of patients	Ultrasound findings					Total No. of patients			
		Group I	Group II	Group III	Group IV	Group V	Without disease		With disease	
							No.	%age	No.	%age
15-18.99	4	2	0	2	0	0	2	50.00	2	50.00
19-22.99	26	17	1	3	2	3	18	69.23	8	30.77
23-26.99	38	26	1	8	1	2	27	71.05	11	28.95
27-30.99	24	10	0	9	4	1	10	41.67	14	58.33
31-34.99	5	1	0	3	1	0	1	20.00	4	80.00
35-38.99	2	0	0	2	0	0	0	0.00	2	100.00
39-42.99	1	0	0	0	1	0	0	0.00	1	100.00
Total	100	56	2	27	9	6	58	58.00	42	42.00

Three patients each from the asymptomatic and the symptomatic category had positive history of oral contraceptive usage in the past (3-6 months). Out of three patients in the asymptomatic category, only one patient showed biliary sludge. In contrast, in the symptomatic category, one showed biliary sludge and one patient had cholelithiasis.

Three patients each from asymptomatic and symptomatic group had positive family history of gallstone disease. Only one patient from the asymptomatic category had cholelithiasis, while one patient from the symptomatic category had chronic cholecystitis, thus, giving an overall percentage of abnormal findings in 33.33% of cases from each category.

Discussion

Gallbladder disease is four times as common in women as in men and pregnancy has been implicated as

one of the factors contributing to the development of gallstones in females. Surgical studies show that 50% of patients with asymptomatic gallstones eventually develop symptoms and 20% develop major complications. The operative mortality is 0.7% in asymptomatic patients and 5% in patients with acute cholecystitis. This increased mortality is also related to increasing age of patients. Thus, early detection of gallstones, and its relationship with pregnancy, in young women is the aim. Out of 200 pregnant patients studied, the gallbladder was successfully visualized in 97.5% of patients. This visualization rate in our series is consistent with the visualization rate of 97.4% reported by Deutchman ME, *et. al.* (4). Of the 5 patients, comprising 2.5% of the patients studied, whose gallbladder could not be visualized initially, were finally diagnosed as having chronic cholecystitis with contracted

gallbladder and thickened gallbladder wall on rescan. This finding was consistent with the findings of Anderson *et. al.* (5).

Majority of patients in our study group were between 21-25 years of age comprising 50% of patients from both the symptomatic as well as asymptomatic category. It is important to note that the incidence of gallbladder disease in the asymptomatic category was higher in patients of higher age and parity. Our findings are, thus, in accordance with the observations made by Peterson R. (6).

In our study, parity of patients studied from both the asymptomatic as well as the symptomatic category varied from nulliparous to para 4. Mean parity was higher in the patients having gallbladder disease. It is, thus, concluded that parity is a major risk factor for the development of gallstones. Young patients with a higher parity are more prone to gallbladder disease. This finding is in agreement with those of Ralph RC (7) and GREPCO (8).

Association between body mass index and presence of gallstones in this study is in accordance with that of Lynn J *et. al.* who too reported a strong significant positive association between BMI and the presence of gallstones (9).

In present study, strong association of use of oral contraceptives and gallbladder disease shows that all pregnant patients with history of having used oral contraceptives in the past must be submitted to USG examination of gallbladder. These findings are consistent with those of Thijs-C *et. al.* who have suggested that modern low dose oral-contraceptives may be safer than

older formulas, but the safety of oral contraceptives should be evaluated by studying bile saturation and biliary function rather than waiting for gallbladder disease to develop (10).

Thus all young pregnant patients specially with high parity, high body mass index, having used oral contraceptives and with family history of gallbladder disease should be subjected to ultrasonographic examinations to rule out gallbladder disease.

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